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(21) Application No **8230680**

(22) Date of filing
27 Oct 1982

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(31) **3142747**

(32) **28 Oct 1981**

(33) **Fed Rep of Germany
(DE)**

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**C7B 120 701 722 727
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**GB 1413180
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GB 1246116
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(54) **Coated heavy metal filters**

(57) The invention relates to a filter made of a perforated metal foil coated with a thin layer of an inter-metallic compound of tin and nickel.

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(12) UK Patent Application (19) GB (11) 2 108 154 A

- (21) Application No 8230680 (54) Coated heavy metal filters
(22) Date of filing 27 Oct 1982 (57) The invention relates to a filter
(30) Priority data made of a perforated metal foil
(31) 3142747 coated with a thin layer of an inter-
(32) 28 Oct 1981 metallic compound of tin and
(33) Fed Rep of Germany nickel.
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ERRATUM

SPECIFICATION NO 2108155A

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Fig. 1

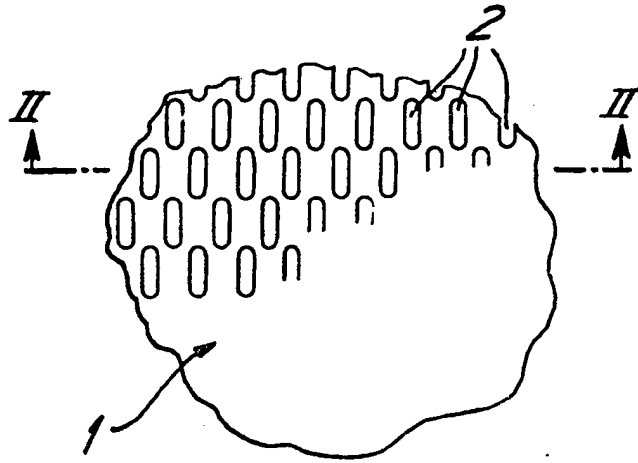
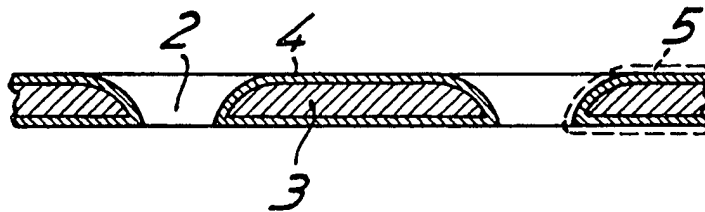


Fig. 2



SPECIFICATION

Perforated metal foil

- 5 Some metals, when coming into contact with foods, beverages, body fluids or the like dissolve in them to a small but not negligible extent. This may be a health hazard, more particularly in the case of some heavy metals such as nickel, and so it is necessary to inhibit this phenomenon. Accordingly, metal parts of domestic appliances have been given a coating of a metal, such as gold or platinum or rhodium, which does not enter into solution so readily and/or is not a health hazard. However, it is expensive to use metals of this kind to coat perforated metal foils.
- 10 Heavy metals of the same kind suffer from the same disadvantages when the perforated foils made of them are used as medical filters, for instance, for body fluids. Contact between the heavy metals and the skin may lead to allergies, for instance, in the case of nickel foils of dry razors. Razor foils of this kind therefore usually have a coating of platinum.
- 15 It is the object of the invention to provide a perforated metal foil of the kind outlined which is not a health hazard in contact with ordinary and luxury foods, beverages or the like, body fluids or the skin, yet has a good resistivity and is less expensive than coatings of a precious metal. According to the invention, therefore, the foil is coated with a layer of an intermetallic compound of tin and nickel. It has been found that a coating of this kind when applied, for instance, to nickel foil coffee filters, provides a reduction of at least 100-fold in the proportion of nickel which dissolves, so that the concentration of nickel in the coffee is far below the level which would be a health hazard.
- 20 To achieve the advantageous properties, the layer may be up to 25 μm thick, preferably between 0.5 and 6 μm .
- 25 The layer may be formed either from a melt or alternatively from an electroplating bath by electrodeposition. Also, the layer may have in addition a coating of a precious metal, which may be very thin, for instance in the range of between 0.05 and 0.5 μm , since the intermetallic layer of tin and nickel ensures that only an insignificant or negligible quantity of heavy metal dissolves.
- 30 A preferred use of the nickel foil according to the invention is for coffee filters, the intermetallic layer of tin and nickel having a thickness of between 1 and 3 μm , and a gold coating being provided of between 0.05 and 0.5 μm thickness. The invention will be described in greater detail hereinafter with reference to diagrammatic drawings of an embodiment, in which
- 35 *Figure 1* is a plan view showing part of a filter foil for a coffee filter, and *Figure 2* is a section on the line II-II of *Fig. 1*. *Fig. 1* shows part of a perforated metal foil 1 provided with perforations 2 in the form of slits having a width of between 50 and 100 μm and a length of approximately 3mm. The foil comprises a base foil 3 of nickel completely coated by a layer 4 of a monophase intermetallic compound of tin and nickel. The nickel content of the layer is approximately 35% and the tin content 65%.
- 40 The layer may be applied to the base foil 3 in any required manner, for instance, by electrodeposition from an electroplating bath. The thickness of the layer 4 is between 1 and 3 μm . If the thickness of the layer is less than 0.5 μm , too much nickel would dissolve and/or the lifetime of the layer is limited. A thickness of the layer exceeding 6 μm is unnecessary to achieve the advantageous effect and should therefore not be considered, since it would afford an unnecessarily long dwell time of the base foil in the bath.
- 45 An example of a bath composition for applying the tin/nickel layer by electroplating is as follows:
- 50
- | | grams/litre | |
|---|-------------|----|
| Tin chloride ($\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$) | 50 | |
| Bivalent tin | 25 | |
| Nickel chloride ($\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$) | 250 | |
| 55 Nickel | 60 | 55 |
| Ammonium bifluoride ($\text{NH}_4\text{F} \cdot \text{HF}$) (Ammonium hydrogen fluoride) | 40 | |
| Ammonium hydroxide solution (NH_3 , 35% Sp.gr. 880) | 35ml/l | |
- 60 The bath is operated with a nickel anode, at a temperature of 70°C and a current density of approximately 2.5 A/dm². The rate of deposition is about 1 μm /minute. However, any other known baths can be used for the preparation of the layer. It has been found that when the metal foil is used as a foil for a coffee filter, the proportion of nickel dissolving in the case of a nickel base foil, is reduced by the intermetallic layer 4 by a factor of from 100 to 135 as compared with an untreated nickel foil.
- 65

As shown by the dashed line of Fig. 2, a layer of a precious metal, for instance, a gold layer 5, may additionally be applied to the layer 4. A filter foil of this kind has the advantage that the gold layer may be relatively thin, since it need not act as a barrier layer for nickel but serves merely to ensure that the filter foil has no effect on flavour. Also, the gold layer has to some extent an additional anticorrosive effect. It is also simpler to keep a gold layer clean. 5

The invention is not limited to the use of nickel for the base foil and is applicable to other base metals, which otherwise would form a risk of dissolving to an excessive concentration in foods or the like or where the metal may cause difficulties if it contacts the skin or body fluids.

The base foil can be produced in various ways, for instance, by etching or stamping or by 10 deposition from an electroplating bath. 10

CLAIMS

1. A perforated metal foil comprising a heavy metal base foil, as a filter for ordinary and luxury foods, beverages or body fluids and as a foil for dry razors, characterised in that the base 15 foil is coated with a layer of an intermetallic compound of tin and nickel. 15
2. A foil according to claim 1, characterised in that the layer has a thickness of up to $25\mu\text{m}$.
3. A foil according to claim 1, characterised in that the layer has a thickness of between 0.5 and $6\mu\text{m}$.
4. A foil according to claim 1, characterised in that the layer is applied from a melt.
- 20 5. A foil according to claim 1, characterised in that the layer is deposited from an electroplating bath. 20
6. A foil according to claim 1, characterised in that the intermetallic layer is coated with a precious metal.
7. A foil according to claim 6, characterised in that the precious metal coating has a 25 thickness of between 0.05 and $0.5\mu\text{m}$. 25
8. A perforated metal foil substantially as hereinbefore described with reference to the accompanying drawings.